CLAIMS

What is claimed is:

1. A multilayered material for fabrication of a nanodevice, comprising:

(a) a device layer; and

(b) a substrate layer adjacent said device layer;

(c) wherein said substrate layer comprises a diffusion layer having a collection region adapted for capture of hydrogen.

2. A material as recited in claim 1, wherein said substrate layer further comprises an insulator layer between said device layer and said diffusion layer.

3. A material as recited in claim 1, wherein said collection region is a heavily doped region for capture of hydrogen.

4. A material as recited in claim 1, wherein said collection region is a getter/acceptor region for capture of hydrogen.

5. A material as recited in claim 1, wherein said device layer comprises a material having at least a portion that has been optimized for fabricating said nanodevice.

6. A material as recited in claim 2, wherein said insulator layer comprises a material that provides a high degree of electrical and thermal insulation between the diffusion layer and the device layer.

7. A material as recited in claim 1, wherein said diffusion layer comprises a material optimized for a high rate of diffusion of hydrogen therethrough.

8. A multilayered material for fabrication of a nanodevice, comprising:

(a) a device layer; and

(b) a substrate layer adjacent said device layer;

(c) wherein said substrate layer comprises a diffusion layer having a

collection region adapted for capture of hydrogen;

(d) wherein said substrate layer further comprises an insulator layer between said device layer and said diffusion layer.

9. A material as recited in claim 8, wherein said collection region is a heavily doped region for capture of hydrogen.

10. A material as recited in claim 8, wherein said collection region is a getter/acceptor region for capture of hydrogen.

11. A material as recited in claim 8, wherein said device layer comprises a material having at least a portion that has been optimized for fabricating said nanodevice.

12. A material as recited in claim 8, wherein said insulator layer comprises a material that provides a high degree of electrical and thermal insulation between the diffusion layer and the device layer.

13. A material as recited in claim 8, wherein said diffusion layer comprises a material optimized for a high rate of diffusion of hydrogen therethrough.

14. A multilayered material for use in fabrication of a nanodevice, comprising:

(a) a device layer;

(b) an insulator layer adjacent said device layer; and

(c) a diffusion layer having a collection region adapted for capture of hydrogen adjacent said insulator layer.

15. A material as recited in claim 14, wherein said collection region is a heavily doped region for capture of hydrogen.

16. A material as recited in claim 14, wherein said collection region is a getter/acceptor region for capture of hydrogen.

17. A material as recited in claim 14, wherein said device layer comprises a material having at least a portion that has been optimized for fabricating said nanodevice.

18. A material as recited in claim 14, wherein said insulator layer comprises a material that provides a high degree of electrical and thermal insulation between the diffusion layer and the device layer.

19. A material as recited in claim 14, wherein said diffusion layer comprises a material optimized for a high rate of diffusion of hydrogen therethrough.

20. A multilayered material for use in fabrication of a nanodevice, comprising:

(a) a layer of material for device fabrication;

(b) a layer of insulator material; and

(c) a layer of material though which hydrogen can diffuse at a high rate and having a collection region adapted for capture of hydrogen;

(d) wherein said layer of insulator material is disposed between said layer of material for device fabrication and said collection region.

21. A material as recited in claim 20, wherein said collection region is a heavily doped region for capture of hydrogen.

22. A material as recited in claim 20, wherein said diffusion layer has a getter/acceptor region for capture of hydrogen.

23. A material as recited in claim 20, wherein said device layer comprises a material having at least a portion that has been optimized for fabricating said nanodevice.

24. A material as recited in claim 20, wherein said insulator layer provides a high degree of electrical and thermal insulation between the diffusion layer and the device layer.

25. A material as recited in claim 20, wherein said diffusion layer comprises a material optimized for a high rate of diffusion of hydrogen therethrough.

26. A multilayered material for use in fabrication of a nanodevice, comprising:

(a) a layer of material for device fabrication, said material having at least a portion that has been optimized for fabricating said nanodevice;

(b) a layer of material though which hydrogen can diffuse at a high rate and having a collection region adapted for capture of hydrogen, said collection region comprising a heavily doped region or a getter/acceptor region;

(c) wherein said diffusion layer comprises a material optimized for a high rate of diffusion of hydrogen therethrough; and

(d) a layer of insulator material, wherein said insulator layer provides a high degree of electrical and thermal insulation between the diffusion layer and the device layer;

(e) wherein the insulator layer is disposed between the device layer and the diffusion layer.

27. A material as recited in claim 1, 8, 14, 20 or 26, further comprising at least one heat dissipation layer.

28. A material as recited in claim 1, 8, 14, 20 or 26, further comprising at least one RF shield layer.

29. A method of fabricating a multilayered material for use in making a nanodevice, comprising:

providing a wafer having at least a portion that has been optimized for making said nanodevice;

implanting said wafer with hydrogen to a depth associated with a thickness to remain after an ion cut; and

bonding said wafer to a substrate layer;

said substrate layer comprising a diffusion layer having a collection region adapted for capture of hydrogen.

30. A method as recited in claim 29, wherein said substrate layer further comprises an insulator layer bonded to said diffusion layer.

31. A method as recited in claim 29, wherein said collection region is a heavily doped region for capture of hydrogen.

32. A method as recited in claim 29, wherein said collection region is a getter/acceptor region for capture of hydrogen.

33. A method as recited in claim 29, further comprising ion cutting said wafer so as to leave a device layer bonded to the substrate layer.

34. A method as recited in claim 30, wherein said substrate layer is formed according to the steps comprising:

creating hydrogen getters in said collection region; and

bonding the insulator layer to a surface of the diffusion layer adjacent the collection region.

35. A method as recited in claim 30, wherein said substrate layer is formed according to the steps comprising:

bonding the insulator layer to a surface of the diffusion layer adjacent the collection region; and

creating hydrogen getters in said collection region beneath said insulator layer.

36. A method as recited in claim 29, further comprising ion cutting said wafer so as to leave a device layer bonded to the substrate layer.

37. A method as recited in claim 36, further comprising:

planarizing said device layer;

bonding said device layer to a 3-d stack or handle;

injecting and diffusing hydrogen into said collection region; and

ion cutting said diffusion layer at said collection region; and

removing said remaining diffusion layer and insulator layer.

38. A method of fabricating a multilayered material for use in making a nanodevice, comprising:

providing a wafer having at least a portion that has been optimized for making said nanodevice;

implanting said wafer with hydrogen to a depth associated with a thickness to remain after an ion cut; and

bonding said wafer to a substrate layer;

said substrate layer comprising a diffusion layer having a collection region adapted for capture of hydrogen;

said substrate comprising an insulator layer bonded to said diffusion layer.

39. A method as recited in claim 38, wherein said collection region is a heavily doped region for capture of hydrogen.

40. A method as recited in claim 38, wherein said collection region is a getter/acceptor region for capture of hydrogen.

41. A method as recited in claim 38, further comprising ion cutting said wafer so as to leave a device layer bonded to the substrate layer.

42. A method as recited in claim 38, wherein said substrate layer is formed according to the steps comprising:

creating hydrogen getters in said collection region; and

bonding the insulator layer to a surface of the diffusion layer adjacent the collection region.

43. A method as recited in claim 38, wherein said substrate layer is formed according to the steps comprising:

bonding the insulator layer to a surface of the diffusion layer adjacent the collection region; and

creating hydrogen getters in said collection region beneath said insulator layer.

44. A method as recited in claim 38, further comprising:

planarizing said device layer;

bonding said device layer to a 3-d stack or handle;

injecting and diffusing hydrogen into said collection region; and

ion cutting said diffusion layer at said collection region; and

removing said remaining diffusion layer and insulator layer.

45. A method of fabricating a multilayered material for use in making a nanodevice, comprising:

providing a wafer having at least a portion that has been optimized for making said nanodevice;

implanting said wafer with hydrogen to a depth associated with a thickness to remain after an ion cut;

bonding said wafer to a substrate layer;

said substrate layer comprising a diffusion layer having a collection region adapted for capture of hydrogen;

said substrate layer comprising an insulator layer bonded to said diffusion layer; and

ion cutting said wafer so as to leave a device layer bonded to the substrate layer.

46. A method as recited in claim 45, wherein said collection region is a heavily doped region for capture of hydrogen.

47. A method as recited in claim 45, wherein said collection region is a getter/acceptor region for capture of hydrogen.

48. A method as recited in claim 45, further comprising ion cutting said wafer so as to leave a device layer bonded to the substrate layer.

49. A method as recited in claim 45, wherein said substrate layer is formed according to the steps comprising:

creating hydrogen getters in said collection region; and

bonding the insulator layer to a surface of the diffusion layer adjacent the collection region.

50. A method as recited in claim 45, wherein said substrate layer is formed according to the steps comprising:

bonding the insulator layer to a surface of the diffusion layer adjacent the collection region; and

creating hydrogen getters in said collection region beneath said insulator layer.

51. A method as recited in claim 45, further comprising:

planarizing said device layer;

bonding said device layer to a 3-d stack or handle;

injecting and diffusing hydrogen into said collection region; and

ion cutting said diffusion layer at said collection region; and

removing said remaining diffusion layer and insulator layer.

52. A method of fabricating a multilayered material for use in making a nanodevice, comprising:

providing a wafer having at least a portion that has been optimized for making

said nanodevice;

implanting said wafer with hydrogen to a depth associated with a thickness to remain after an ion cut;

forming a diffusion layer having a region for collecting hydrogen;

bonding said diffusion layer to an insulator layer;

bonding said insulator layer to said wafer; and

ion cutting said wafer so as to leave a device layer bonded to the substrate layer.

53. A method as recited in claim 52, wherein said collection region is a heavily doped region for capture of hydrogen.

54. A method as recited in claim 52, wherein said collection region is a getter/acceptor region for capture of hydrogen.

55. A method as recited in claim 52, wherein said substrate layer is formed according to the steps comprising:

creating hydrogen getters in said collection region; and

bonding the insulator layer to a surface of the diffusion layer adjacent the collection region.

56. A method as recited in claim 52, wherein said substrate layer is formed according to the steps comprising:

bonding the insulator layer to a surface of the diffusion layer adjacent the collection region; and

creating hydrogen getters in said collection region beneath said insulator layer.

57. A method as recited in claim 52, further comprising:

planarizing said device layer;

bonding said device layer to a 3-d stack or handle;

injecting and diffusing hydrogen into said collection region; and

ion cutting said diffusion layer at said collection region; and

removing said remaining diffusion layer and insulator layer.

58. A method of fabricating a multilayered material for use in making a nanodevice, comprising:

providing a wafer having at least a portion that has been optimized for making said nanodevice;

implanting said wafer with hydrogen to a depth associated with a thickness to remain after an ion cut;

forming a diffusion layer having a region for collecting hydrogen;

bonding said diffusion layer to an insulator layer;

bonding said insulator layer to said wafer;

ion cutting said wafer so as to leave a device layer bonded to the substrate layer; and

planarizing said device layer.

59. A method as recited in claim 58, wherein said collection region is a heavily doped region for capture of hydrogen.

60. A method as recited in claim 58, wherein said collection region is a getter/acceptor region for capture of hydrogen.

61. A method as recited in claim 58, wherein said substrate layer is formed according to the steps comprising:

creating hydrogen getters in said collection region; and

bonding the insulator layer to a surface of the diffusion layer adjacent the collection region.

62. A method as recited in claim 58, wherein said substrate layer is formed according to the steps comprising:

bonding the insulator layer to a surface of the diffusion layer adjacent the collection region; and

creating hydrogen getters in said collection region beneath said insulator layer.

63. A method as recited in claim 58, further comprising:

bonding said device layer to a 3-d stack or handle;

injecting and diffusing hydrogen into said collection region; and

ion cutting said diffusion layer at said collection region; and

removing said remaining diffusion layer and insulator layer.

64. A method of fabricating a nanodevice, comprising:

providing a wafer having at least a portion that has been optimized for making said nanodevice;

implanting said wafer with hydrogen to a depth associated with a thickness to remain after an ion cut;

forming a diffusion layer having a region for collecting hydrogen;

bonding said diffusion layer to an insulator layer;

bonding said insulator layer to said wafer;

ion cutting said wafer so as to leave a device layer bonded to the substrate layer;

planarizing said device layer;

bonding said device layer to a 3-d stack or handle;

injecting and diffusing hydrogen into said collection region; and

ion cutting said diffusion layer at said collection region.

65. A method as recited in claim 64, wherein said collection region is a heavily doped region for capture of hydrogen.

66. A method as recited in claim 64, wherein said collection region is a getter/acceptor region for capture of hydrogen.

67. A method as recited in claim 64, wherein said substrate layer is formed according to the steps comprising:

creating hydrogen getters in said collection region; and

bonding the insulator layer to a surface of the diffusion layer adjacent the collection region.

68. A method as recited in claim 64, wherein said substrate layer is formed according to the steps comprising:

bonding the insulator layer to a surface of the diffusion layer adjacent the collection region; and

creating hydrogen getters in said collection region beneath said insulator layer.

69. A method as recited in claim 64, further comprising:

removing said remaining diffusion layer and insulator layer.

70. A method of fabricating a nanodevice, comprising:

providing a wafer having at least a portion that has been optimized for making said nanodevice;

implanting said wafer with hydrogen to a depth associated with a thickness to remain after an ion cut;

bonding a diffusion layer to an insulator layer;

said diffusion layer having a region for collecting hydrogen;

bonding said insulator layer to said wafer;

ion cutting said wafer so as to leave a device layer bonded to the substrate layer;

planarizing said device layer;

bonding said device layer to a 3-d stack or handle;

injecting and diffusing hydrogen into said heavily doped region;

ion cutting said diffusion layer at said heavily doped region; and

removing said remaining diffusion layer and insulator layer.

71. A method as recited in claim 70, wherein said collection region is a heavily doped region for capture of hydrogen.

72. A method as recited in claim 70, wherein said collection region is a getter/acceptor region for capture of hydrogen.

73. A method as recited in claim 70, further comprising ion cutting said wafer so as to leave a device layer bonded to the substrate layer.

74. A method as recited in claim 70, wherein said substrate layer is formed according to the steps comprising:

creating hydrogen getters in said collection region; and

bonding the insulator layer to a surface of the diffusion layer adjacent the collection region.

75. A method as recited in claim 70, wherein said substrate layer is formed according to the steps comprising:

bonding the insulator layer to a surface of the diffusion layer adjacent the collection region; and

creating hydrogen getters in said collection region beneath said insulator layer.

76. A method as recited in claim 34, 35, 42, 43, 49, 50, 55, 56, 61, 62, 67, 68, 74 or 75, wherein said hydrogen getters are created by atomic injection.

77. A method as recited in claim 34, 35, 42, 43, 49, 50, 55, 56, 61, 62, 67, 68, 74 or 75, wherein said hydrogen getters are created by plasma injection.

78. A method as recited in claim 34, 35, 42, 43, 49, 50, 55, 56, 61, 62, 67, 68, 74 or 75, wherein said hydrogen getters are created by injection from a solid source adjacent said diffusion layer.

79. A method as recited in claim 34, 35, 42, 43, 49, 50, 55, 56, 61, 62, 67, 68, 74 or 75, further comprising pulse heating said diffusion layer during injection of hydrogen getters.

80. A method as recited in claim 29, 38, 45, 52, 58, 64 or 70, further comprising forming vias and metallization to connect two or more said layers.